DEPARTMENT of AGRICULTURE and NATURAL RESOURCES
JOE FOSS BUILDING
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PIERRE SD 57501-3182
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RECOMMENDATION OF CHIEF ENGINEER FOR WATER PERMIT APPLICATION NO. 8765-3, Barry Van Osdel

Pursuant to SDCL 46-2A-2, the following is the recommendation of the Chief Engineer, Water Rights Program, Department of Agriculture and Natural Resources concerning Water Permit Application No. 8765-3, Barry Van Osdel, 44732 SD Highway 50, Mission Hill SD 57046.

The Chief Engineer is recommending APPROVAL of Application No. 8765-3 because 1) there is reasonable probability that there is unappropriated water available for the applicant's proposed use, 2) the proposed diversion can be developed without unlawful impairment of existing domestic water uses and water rights, 3) the proposed use is a beneficial use and 4) it is in the public interest as it pertains to matters of public interest within the regulatory authority of the Water Management Board with the following qualifications:

1. The well approved under Water Permit No. 8765-3 is located near domestic wells and other wells which may obtain water from the same aquifer. Water withdrawals shall be controlled so there is not a reduction of needed water supplies in adequate domestic wells or in adequate wells having prior water rights.

2. The well authorized by Permit No. 8765-3 shall be constructed by a licensed well driller and construction of the well and installation of the pump shall comply with Water Management Board Well Construction Rules, Chapter 74:02:04 with the well casing pressure grouted (bottom to top) pursuant to Section 74:02:04:28.

3. Pursuant to SDCL 46-5-6 which allows a greater diversion rate if the method of irrigation, time constraints, or type of soils so requires, Permit No. 8765-3 authorizes a maximum diversion rate of 1.78 cfs for the irrigation of 84 acres with an annual volume not to exceed 2 acre feet of water per acre per year.

4. This Permit is approved subject to the irrigation water use questionnaire being submitted each year.

See report on application for additional information.

Eric Gronlund

Eric Gronlund, Chief Engineer
July 10, 2023

Report to the Chief Engineer

On Water Permit Application No. 8765-3

Barry Van Osdel

June 23, 2023

Water Permit Application No. 8765-3 proposes to appropriate water at a maximum instantaneous diversion rate of 1.78 cubic feet per second (cfs) from one well to be completed into the Lower James-Missouri aquifer (approximately 200 feet deep) in the northern region of SE ¼ NE ¼ of Section 2 for the irrigation of 84 acres located in the E ½ SE ¼, SE ¼ NE ¼ of Section 2, all in T94N-R55W. The site of interest is in Yankton County, approximately 7 miles northeast of Yankton, SD. The applicant is requesting a diversion rate greater than the statutory limit of 1 cfs per 70 acres.

AQUIFER: Lower James-Missouri (LJM)

HYDROGEOLOGY:

The Lower James Missouri aquifer is a glacial outwash primarily consisting of interbedded medium sand and coarse gravel (Bugliosi, 1986), that underlies portions of Clay, Hutchinson and Yankton Counties (Table 1). Layers of silty alluvium up to 25 feet thick generally overlay the glacial outwash material (Bugliosi, 1986). The Lower James-Missouri aquifer is hydraulically connected to many surface water features as well as the Lower Vermillion-Missouri aquifer, the Missouri: Elk Point aquifer, the Lower James-Missouri: Scotland aquifer, the Choteau: East aquifer, the Dakota aquifer, the Niobrara aquifer, and in the northeast by the underlying Sioux Quartzite (Bugliosi, 1986; Lindgren and Hansen, 1990). The Lower James-Missouri aquifer is generally under confined conditions east of the James River, near its western boundary, and unconfined elsewhere (Lindgren and Hansen, 1990). Depth to the top of the aquifer can vary from 245 feet to less than 1 foot within the James River flood plain (Lindgren and Hansen, 1990), but generally is within 100 feet of the land surface (Bugliosi, 1983). A portion of the Lower James-Missouri aquifer is designated as the Scotland management unit, but it is not included in the area of interest for Water Permit Application No. 8765-3 and will be excluded from this report. Figure 1 shows the approximate delineation of the Lower James-Missouri aquifer and location of the proposed diversion point.

Table 1: Estimated areal extent of Lower James-Missouri aquifer in Clay, Hutchinson, and Yankton Counties, and recoverable water in storage (Hedges et al., 1982).

County	Areal Extent (acres)	Recoverable Water in Storage (acre-feet
Clay	5,400	81,000
Hutchinson	93,800	633,150
Yankton	92,500	2,081,250
Total	**191,700**	**2,795,400**

No water well or test hole completion report was submitted with Water Permit Application No. 8765-3. Within approximately two miles of the proposed diversion point, water well completion reports and lithologic logs on file for wells completed into the Lower James-Missouri aquifer for appropriative water uses vary between confined and unconfined conditions. Saturated aquifer thicknesses range from approximately 40 to 90 feet. This would allow for sufficient saturated thickness for a pump to be placed 20 feet below the top of the aquifer, which is required for the well to be considered adequate under ARSD 74:02:04:20(6). Depth to the top of aquifer materials ranges from approximately 100 to 160 feet, and static water levels vary between approximately 115 to 140 feet below the ground surface at the time of well completion (SDGS, 2023; Water Rights, 2023b and 2023d). Wells with a shallower top of aquifer depth are generally in the buried, unconfined portion of the Lower James-Missouri, and are often in the floodplain of the James River (Bugliosi, 1983). Based on the well-completion reports, and lithologic logs on file for observation wells near the proposed diversion point, the Lower James-Missouri aquifer could be unconfined or confined near the proposed diversion point (SDGS, 2023; Water Rights 2023b and 2023d), but will most likely have confined aquifer conditions based on the estimated well depth (200 feet) requested by Water Permit Application No. 8765-3.

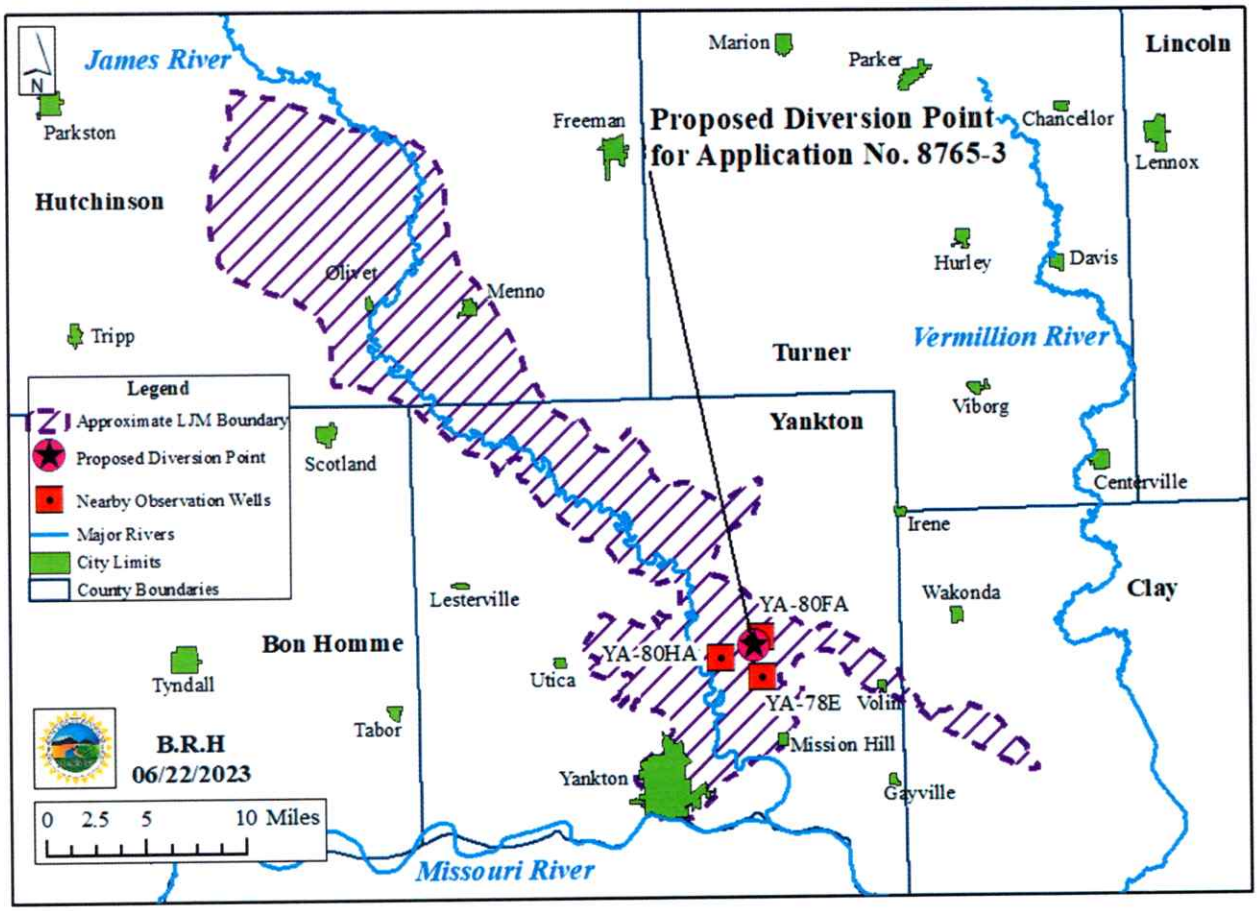

Figure 1: Map of the Approximate Lower James-Missouri aquifer boundary (modified from Hedges et al., 1982) and the location of the proposed diversion point for Water Permit No. 8765-3 and three closest observation wells.

South Dakota Codified Law (SDCL) 46-2A-9:

Pursuant to SDCL 46-2A-9, "A permit to appropriate water may be issued only if there is a reasonable probability that there is unappropriated water available for the applicant's proposed use, that the diversion point can be developed without unlawful impairment of existing domestic water uses and water rights, and that the proposed use is a beneficial use and in the public interest as it pertains to matters of public interest within the regulatory authority of the Water Management Board as defined by SDCL 46-2-9 and 46-2-11." This report will address the availability of unappropriated water and the potential for unlawful impairment of existing domestic water uses and water rights within the Lower James-Missouri aquifer.

SDCL 46-5-6:

Pursuant to SDCL 46-5-6, the diversion rate for an irrigation appropriation cannot be in excess of 1.0 cfs per 70 acres, or "the equivalent thereof." The statute provides that: "The Water Management Board may allow a greater diversion, in volume or rate or both, if the method of irrigation, any time constraints on diversion of water, or the type of soil so requires..."

If approved, Water Permit Application No. 8765-3 would authorize a maximum instantaneous diversion rate of 1.78 cfs from one well for the irrigation of 84 acres, from May 1st through October 31st, or at a rate of 1.48 cfs per 70 acres. The applicant did not provide a reason for the exceedance, but it appears to be due to a center pivot size and both pivots only making a partial rotation. The one pivot is smaller than a normal, quarter-sized pivot; however, smaller pivots often use a proportionally greater diversion rate to operate properly than their size would indicate is needed. Furthermore, both pivots are only making a partial rotation. A center pivot making a partial rotation uses water at the same rate as a center pivot making a full rotation while irrigating less acres. These reasons fall within SDCL 46-5-6 which allows the Water Management Board to allow a greater diversion rate and have been accepted by the Board and the Water Rights Program in the past.

WATER AVAILABILITY:

Water Permit Application No. 8765-3 proposes to appropriate water from the Lower James-Missouri aquifer. The probability of unappropriated water being available from the aquifer can be evaluated by considering SDCL 46-6-3.1, which requires "No application to appropriate groundwater may be approved if, according to the best information reasonably available, it is probable that the quantity of water withdrawn annually from a groundwater source will exceed the quantity of the average estimated annual recharge of water to the groundwater source. An application may be approved, however, for withdrawals of groundwater from any groundwater formation older than or stratigraphically lower than the Greenhorn formation in excess of the average estimated annual recharge for use by water distribution systems."

Water Permit Application No. 8765-3 does not involve a water distribution system as defined by SDCL 46-1-6(17) and the aquifer is both younger and above the Greenhorn formation (Fahrenbach et al., 2010). Therefore, recharge and withdrawal must be considered. The methods

of assessment are a hydrologic budget with quantified values of recharge and withdrawal, and observation well analysis.

HYDROLOGIC BUDGET:

Recharge

Recharge to the Lower James Missouri aquifer is primarily through the infiltration of precipitation, on the basis of the significant permeability of the overlying soils which recharges the underlying alluvium and adjacent glacial aquifers. These alluvial deposits and adjacent aquifers act as either a recharge or discharge area depending on the relative potentiometric-surface altitudes (Bugliosi, 1986). The Choteau and Dakota aquifers, and fractures in the Sioux Quartzite are sources of recharge in the northwest areal extent of Lower James-Missouri aquifer (Lindgren and Hansen, 1990). Most recharge to glacial aquifers occurs during the spring and early summer months, and the amount of recharge varies due to fluctuating climatic conditions (Bugliosi, 1986).

Recharge rates have been calculated using regional flow-net analysis for the Lower James-Missouri aquifer and is estimated to be 1.5 inches/year (Hedges et al., 1985). The aquifer has an estimated total areal extent of 191,700 acres (Table 1). Therefore, the estimated average annual recharge rate is approximately 23,963 acre-feet/year.

Observation well data was analyzed to estimate a recharge rate of 3.9 inches/year for the unconfined portions of the Lower James-Missouri aquifer (Hedges et al., 1985). The areal extent of the unconfined portion of Lower James-Missouri aquifer was delineated to be approximately 82,200 acres (Stonesifer, 2014); however, this larger areal extent included portions of the aquifer that were delineated in McCook and Clay Counties based on SDGS lithologic logs (Stonesifer, 2014). The recharge rate of 3.9 inches/year was applied to this area to get a recharge for unconfined portions of the Lower James-Missouri aquifer of 26,700 acre-feet/year, which could be considered a maximum recharge rate. Overall, the estimated average annual recharge to the aquifer ranges between approximately 23,963 to 26,700 acre-feet/year (Hedges et al., 1982 and 1985; Stonesifer, 2014).

Discharge

Discharge from the Lower James-Missouri aquifer is primarily through well withdrawals, seepage to the James River via flood-plain alluvium, and evapotranspiration in areas where the aquifer is at or near land surface (Bugliosi, 1986; Lindgren and Hansen, 1990; Water Rights, 2023c). It is likely that areas of the Lower James-Missouri aquifer discharge into adjacent glacial aquifers depending on the relative potentiometric altitudes, however, the direction of water movement in the aquifer is toward the James River (Bugliosi, 1986; Lindgren and Hansen, 1990).

There are currently 132 established water rights/permits (irrigation and non-irrigation use) and one pending application that are authorized to appropriate water from the Lower James-Missouri aquifer (Water Rights, 2023c). Table 2 summarizes the eight non-irrigation water rights/permits authorized to appropriate water from the Lower James-Missouri aquifer with the estimated

annual use in acre-feet per year for each water right/permit as determined by their permitted maximum diversion rate or annual volume. Non-irrigation water use that is only limited by an instantaneous diversion rate is assumed to be pumping 60% of full time at the respective permitted diversion rates. Non-irrigation water rights/permits limited by an annual volume are assumed to withdraw their entire respective annual volume limitation. These are standard assumptions used by the DANR-Water Rights Program for estimating annual withdrawals from non-irrigation appropriations from an aquifer (Water Rights, 2023c). Overall, the estimated average annual withdrawal rate from the Lower James-Missouri aquifer by the non-irrigation water rights/permits is approximately 1,594.6 acre-feet per year (Table 2) (Water Rights, 2023c).

Table 2: Estimated annual use for the non-irrigation water rights/permits authorized to divert water from the Lower James-Missouri aquifer (Water Rights, 2023c).

Permit No.	Name	Use	Status	Authorized Diversion Rate (cfs)	Authorized Annual Volume (acre-feet)	Estimated Use (acre-feet/year)
4556-3	Knife River	COM	LC	0.44	N/A	191.1
840-3	Stuelpnagels Inc.	COM	LC	1.11	N/A	482.2
6264-3	Yankton Land & Cattle Co.	COM	LC	0.56	N/A	243.3
6320-3	Wolf Creek Httrn. Brth.	COM	LC	0.08	N/A	34.8
6925-3	Tschetter Colony	COM	LC	0.07	N/A	30.4
7827-3	Maxwell Colony	COM	PE	0.33	N/A	143.4
1288-3	National Food Stores Inc.	IND	LC	0.16	N/A	69.5
8412-3	Knife River	IND	LC	7.8	400	400
COM (Commercial), IND (Industrial), LC (Licensed Water Right), PE (Water Permit)					**TOTAL**	**1,594.6**

Irrigation water rights/permits have been required to report their annual usage on an irrigation questionnaire since 1979. The estimated average annual withdrawal rate for the aquifer irrigation water rights/permits that have reported over the period of record (1979 to 2021) is approximately 2,951 acre-feet per year (Table 3) (Water Rights, 2023a). To reflect the current development of irrigation water rights/permits more accurately, the average annual withdrawal rate for irrigation appropriations from 2012 to 2021 is approximately 5,398 acre-feet per year (Table 3) (Water Rights, 2023a).

There are currently 124 irrigation water rights/permits authorized to appropriate water from the Lower James-Missouri aquifer (Water Rights, 2023c). Table 3 lists 120 water rights/permits as per the 2021 irrigation questionnaire (IQ) survey, and permit applications approved for irrigation use since then include Permit Nos. 8655-3, 8659-3, 8736-3, and 8740-3 and the pending Water Permit Application No. 8762-3, authorizing the irrigation of 810. Generally, irrigators in eastern South Dakota apply less than one foot of water per acre per year. To account for the fluctuation in wet and dry cycles from year to year, this value is used to overestimate the annual withdrawal rate for these irrigation water rights/permits. Therefore, the estimated average annual withdrawal rate for the four irrigation water rights/permits (and one pending) not listed on Table 3 is approximately 810 (Water Rights, 2023a and 2023c). The collective average annual withdrawal rate for the irrigation water rights/permits from 2012 to 2021 (5,398 acre-feet/year), plus the

estimated average annual withdrawal rate for the irrigation water rights/permits approved after the 2021 IQ survey (810 acre-feet/year) is approximately 6,208 acre-feet/year (Water Rights, 2023a and 2023c).

There are domestic wells completed into the Lower James Missouri aquifer that do not require a water right/permit, so the withdrawal amount from those wells is unknown (Water Rights, 2023d). Due to their relatively low diversion rates, withdrawals from domestic wells are generally not considered to be a significant portion of the hydrologic budget. Additionally, rural water systems have been developed in areas where the Lower James-Missouri aquifer is the uppermost aquifer available, and it is likely that some domestic users may have transitioned to rural water. Therefore, the quantity of water withdrawn by domestic wells is estimated to be negligible to the hydrologic budget for the Lower James-Missouri aquifer.

Table 3: Reported historic irrigation use from the Lower James-Missouri aquifer and summary statistics from 1979 to 2021 (Water Rights, 2023a).

Year	No. of Permits Reporting	Reported Volume Pumped (acre-feet)
1979	22	588.00
1980	23	1,299.00
1981	33	1,835.00
1982	23	1,301.25
1983	27	1,306.54
1984	28	1,360.00
1985	27	1,483.00
1986	30	989.60
1987	30	1,041.60
1988	31	2,744.90
1989	31	2,144.80
1990	35	2,928.10
1991	42	2,599.00
1992	45	1,159.00
1993	45	230.44
1994	45	1,918.17
1995	41	1,483.32
1996	49	2,101.99
1997	50	2,320.00
1998	53	2,787.03
1999	50	2,102.15
2000	51	3,751.08
2001	53	2,940.09
2002	53	4,061.52
2003	53	2,843.15
2004	47	2,886.65
2005	48	2,866.63
2006	50	3,630.92
2007	56	3,425.91
2008	79	4,494.03
2009	84	1,463.27
2010	85	665.37
2011	89	4,147.47
2012	93	13,058.45
2013	118	7,855.75
2014	125	3,347.24
2015	127	4,822.86
2016	126	5,747.01
2017	126	5,727.12
2018	126	1,035.87
2019	127	328.01
2020	121	3,864.53
2021	120	8,195.56
Max	127	13,058.45
Min	22	230.44
Avg (1979-2021)	63	2,950.73
Avg (2012-2021)	121	5,398.24

Hydrologic Budget Summary

The estimated average annual recharge rate to the Lower James-Missouri aquifer is approximately 23,963 to 26,700 acre-feet/year (Hedges et al., 1982 and 1985; Stonesifer, 2014). The estimated average annual withdrawal rate from the aquifer is approximately 7,887 acre-feet per year (non-irrigation: 1,594.6 acre-feet/year; irrigation (2012 to 2021 IQ survey average plus the water rights/permits approved or pending since then): 6,208 acre-feet/year; Water Permit Application No. 8765-3 (if approved, assuming one foot application rate per authorized acre): 84 acre-feet/year). Based on the hydrologic budget, there is a reasonable probability unappropriated water is available from the Lower James-Missouri aquifer for the proposed appropriation.

OBSERVATION WELL DATA:

Administrative Rule of South Dakota (ARSD) 74:02:05:07 requires that the Water Management Board shall rely upon the record of observation well measurements in addition to other data to determine that the quantity of water withdrawn annually from the aquifer does not exceed the estimated average annual recharge of the aquifer.

Observation wells provide data on how the aquifer reacts to regional climatic conditions and local pumping. The DANR-Water Rights Program monitors 34 observation wells completed into the Lower James-Missouri aquifer (Water Rights, 2023b). The three closest observation wells to the proposed diversion point (as shown in Figure 1) are YA-80FA (approximately 0.3 miles northeast), YA-78E (approximately 1.75 miles southeast), and YA-80HA (approximately 2 miles southwest) (Water Rights, 2023b). Hydrographs of observation wells are constructed by measuring the static water level from the top of the well casing over a period of record. The hydrographs of these nearest observation wells are displayed in Figures 2 to 4 (Water Rights, 2023b). It is worth noting that the hydrograph titles display DENR Water Rights Observation Well when the titles should display DANR Water Rights Observation Well.

The overall trend for the hydrographs of the nearest observation wells to the proposed diversion point display stable to slightly lower recent water levels over the respective periods of record. These three hydrographs were compared to the hydrographs for the other observation wells completed in the aquifer, and each display a similar trend, apart from observation well HT-2023B which doesn't have enough data to be conclusive (Water Rights, 2023b). The recent decline shown in a few observation wells is likely due to the connection between the Lower James-Missouri and Missouri: Elk Point aquifers. The Missouri: Elk point aquifer has significant connection to the Missouri and the changes of the water level of the Missouri River affect the aquifer as documented in the report on Future Use Permit Application No. 8754-3 (Water Rights, 2023c). This, in turn, affects the water levels of the observation wells in close proximity to the Missouri: Elk Point aquifer.

The hydrographs for the aquifer indicate that it responds well to climatic conditions because water levels are rising during wetter periods and declining to a stable water level during drier periods. Additionally, the water levels in the observation wells display that the aquifer returns to pre-pumped conditions between irrigation seasons. Aquifer recovery indicates that climatic conditions and therefore, recharge to and natural discharges from the aquifer govern the long-term fluctuations of water levels in the aquifer rather than the impacts of pumping from the Lower James-Missouri aquifer. Therefore, observation well hydrographs demonstrate that unappropriated water is available for the proposed appropriation.

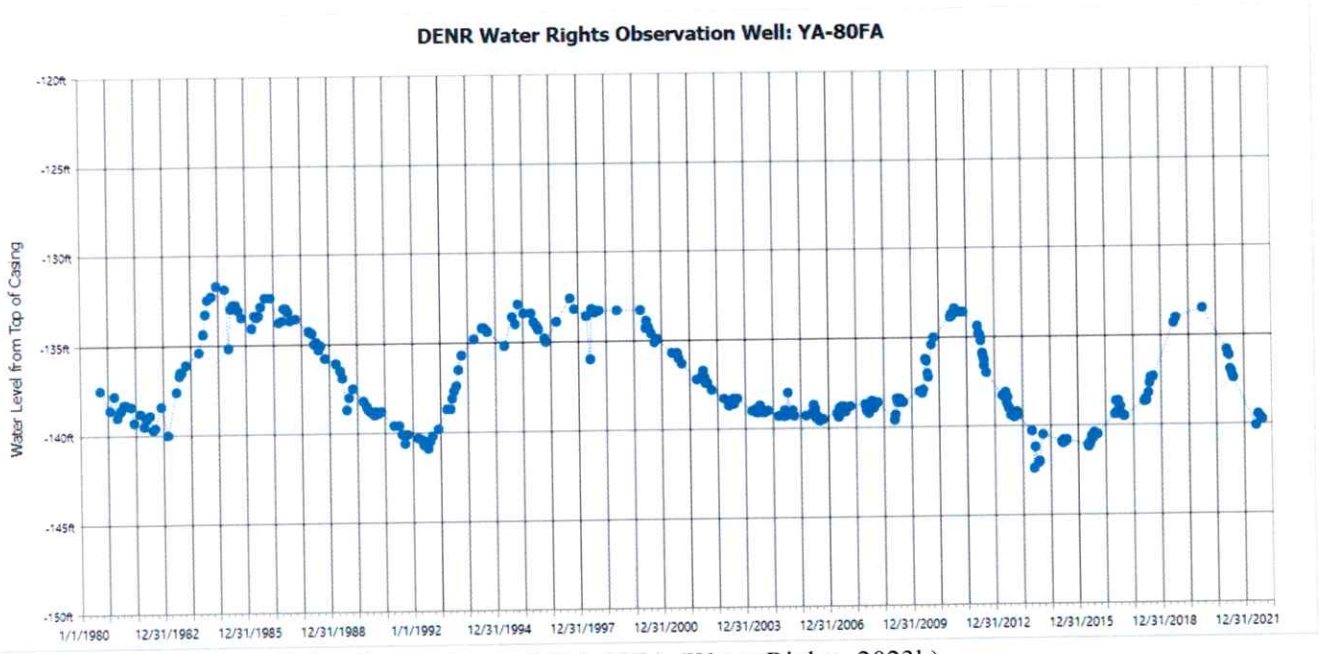

Figure 2: Hydrograph for observation well YA-80FA (Water Rights, 2023b).

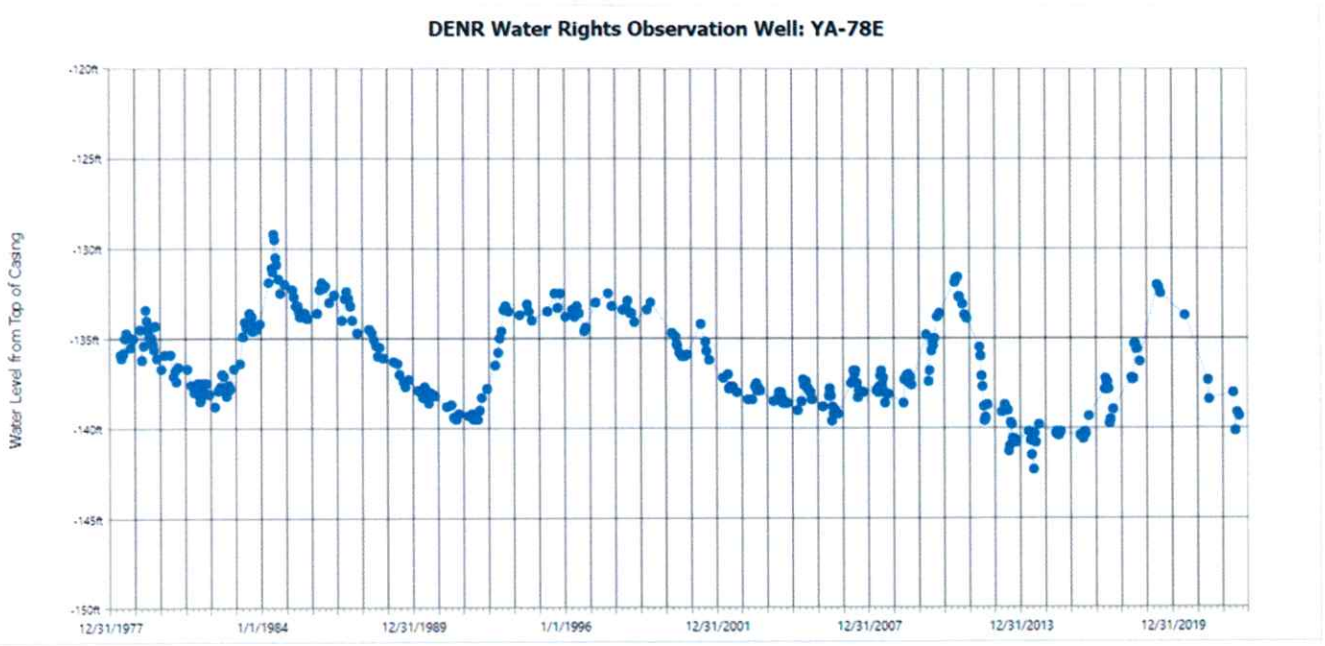

Figure 3: Hydrograph for observation well YA-78E (Water Rights, 2023b).

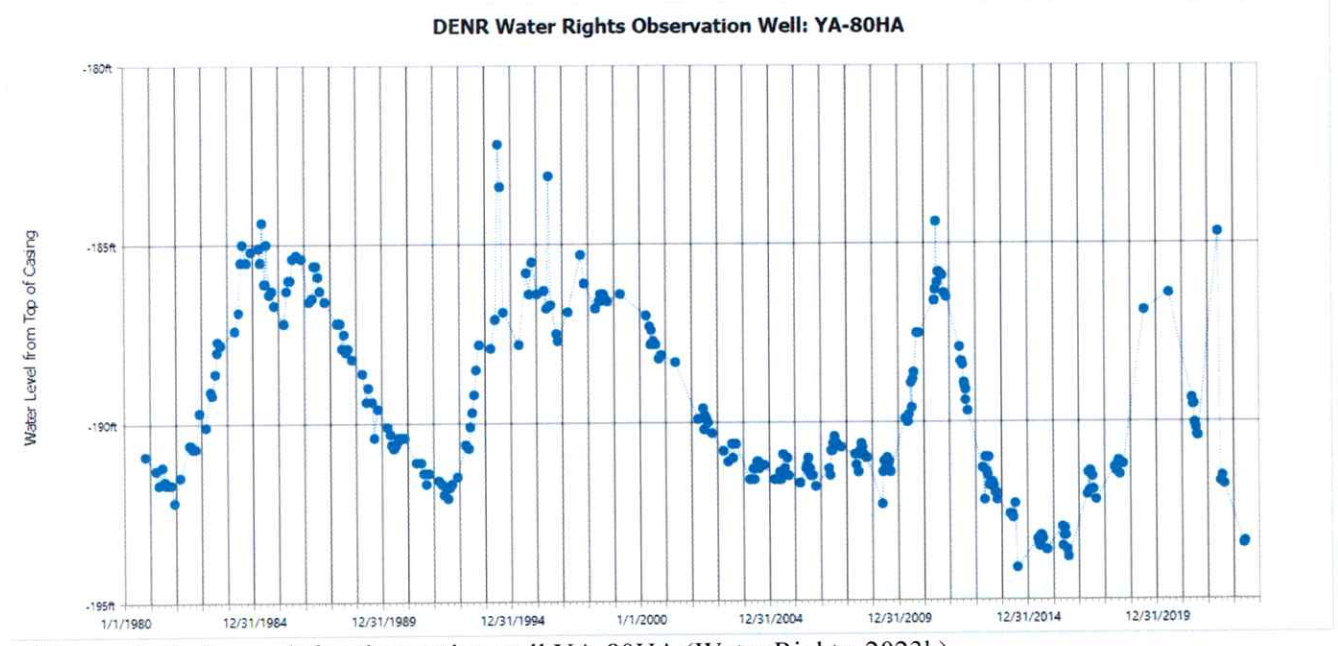

Figure 4: Hydrograph for observation well YA-80HA (Water Rights, 2023b).

POTENTIAL FOR UNLAWFUL IMPAIRMENT OF EXISTING WATER RIGHTS:

There are currently 132 water rights/permits authorized (plus pending Water Permit Application No. 8762-3) to appropriate water from the Lower James-Missouri aquifer (Water Rights, 2023c). The closest water right/permit to the proposed diversion point is Water Right No. 8233-3, which is held by Randy Svendsen and Sons. The diversion point for Water Right No. 8233-3 is located approximately 0.5 miles north of the proposed diversion point for this application (Table 4) (Figure 5) (Water Rights, 2023c).

There are domestic wells on file with the DANR-Water Rights Program that are completed into the Lower James-Missouri aquifer, with the closest domestic well on file (not held by the applicant) approximately 0.6 miles southwest of the proposed diversion point (Water Rights, 2023d). There could potentially be other domestic wells completed into the aquifer near the proposed diversion point that are not on file with the DANR-Water Rights Program. The location of the domestic wells is based on the location provided at the time of completion by the well driller.

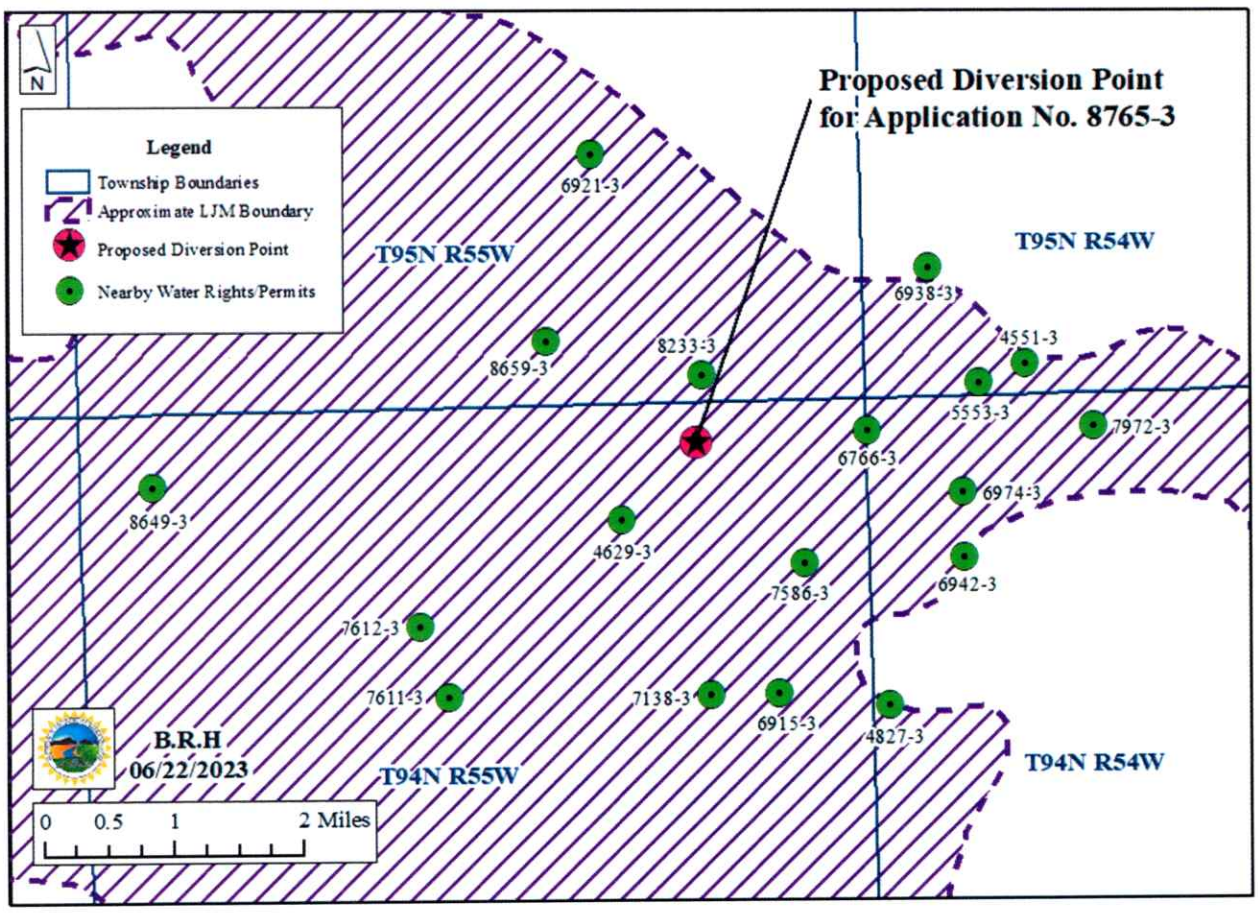

Figure 5: Map of the approximate Lower James-Missouri aquifer boundary (modified from Hedges et al., 1982) showing nearby existing water rights/permits within five miles around the proposed diversion point for Water Permit Application No. 8765-3.

Table 4: List of existing Lower James-Missouri aquifer water rights/permits near the proposed diversion point as shown on Figure 5 (Water Rights, 2023c).

Permit No.	Name	Priority	Status	Use Type	CFS	Acres	Distance to Proposed Diversion Point (miles)
8233-3	Randy Svendsen & Sons	03/08/1982	LC	IRR	1.78	268	0.53
4629-3	Mary Anne Boyd	01/19/1981	LC	IRR	1.78	154	0.81
7586-3	Three Sisters Farms	12/20/2012	LC	IRR	1.78	143	1.24
6766-3	Valerie West-Svendsen	11/09/2006	LC	IRR	1.94	136	1.32
8659-3	Dahlerup Family Trust	02/12/2014	LC	IRR	3.12	368	1.4
7138-3	Morris Nelson Farms Inc.	05/21/2009	LC	IRR	1.89	134	1.94
6974-3	Paul Gustad	01/18/2008	LC	IRR	1.56	127	2.08
6915-3	Gary Smith	12/07/2007	LC	IRR	1.65	64	2.02
5553-3	Lyle Stratman	03/27/1991	LC	IRR	2	211	2.22
6942-3	Craig L. Johnson	01/22/2008	LC	IRR	2.11	292	2.24
6938-3	Dean R. Morman	01/16/2008	LC	IRR	1.56	132	2.24
6921-3	Randy Svendsen & Sons	12/10/2007	LC	IRR	1	128	2.37
4827-3	Gary Smith	10/26/1981	LC	IRR	1.83	128	2.5
7612-3	Dan Hacecky	01/04/2013	LC	IRR	1.65	153	2.55
4551-3	Dennis/Darrell Nelson	08/25/1980	LC	IRR	1.78	140	2.6
7611-3	Dan Hacecky	01/04/2013	LC	IRR	1.83	77	2.72
7972-3	Nelson AG Holdings LLC	02/13/2014	LC	IRR	1.67	116	3.05
8649-3	Marquardt Family LP	09/30/2010	LC	IRR	4.34	388	4.19

The Lower James-Missouri aquifer varies between confined and unconfined conditions. For an unconfined aquifer, drawdown created by pumping does not extend far from the pumped well. In confined conditions, drawdown from a pumping well can extend some distance from the well. Considering the location of the proposed diversion point compared to nearby water well completion reports and lithologic logs on file, the Lower James-Missouri aquifer is expected to be confined near the proposed diversion point (SDGS, 2023; Water Rights, 2023b and 2023d). Nearby observation wells YA-80IA and YA-78E are confined and can provide insight to how the aquifer responds to pumping. Lithologic logs for well YA-78E state that the top of aquifer is at a depth of 157 feet with static water levels at a depth of approximately 140 feet. Observation well YA-80IA is also confined with a top of aquifer at a depth of 135 feet and static water level at a depth of approximately 115 feet (SDGS, 2023; Water Rights, 2023b). This indicates that there is artesian head pressure in the well. Both wells are within approximately two miles of high-yield irrigation water rights/permits (Water Rights, 2023b and 2023c). A high yield well is one that is assumed to have a diversion rate greater than 0.2 cfs.

The Water Management Board recognizes that putting water to beneficial use requires a certain amount of drawdown to occur. The Board has developed rules to allow water to be placed to maximum beneficial use without the necessity of maintaining artesian head pressure for domestic use. The Water Management Board defined an "adversely impacted domestic well" in ARSD 74:02:04:20(7) as:

> "A well in which the pump intake was set at least 20 feet below the top of the aquifer at the time of construction or, if the aquifer is less than 20 feet thick, is as near to the bottom of the aquifer as is practical and the water level of the aquifer has declined to a level that the pump will no longer deliver sufficient water for the well owner's needs."

The Water Management Board considered the delivery of water by artesian head pressure versus maximum beneficial use during the issuance of Water Right No. 2313-2 for Coca-Cola Bottling Company of the Black Hills. The Board adopted the Findings of Facts and Conclusions of Law that noted the reservation of artesian head pressure for delivery of water would be inconsistent with SDCL 46-1-4 which states, "general welfare requires that the water resources of the state be put to beneficial use to the fullest extent of which they are capable..." (Water Rights, 1995).

Furthermore, the Water Management Board found if increased cost or decreased production as a result of impacts on artesian head pressure by legitimate users is to be considered as an unlawful impairment, it would also conflict with SDCL 46-1-4 (Water Rights, 1995). With that in mind, some existing well owners may need to install or lower pumps depending on the specific characteristics of the Lower James-Missouri aquifer at their location.

When considering the statutes (SDCL 46-1-4 and 46-6-6.1), rules (ARSD 74:02:04:20(6) and (7)), the saturated aquifer thickness near the proposed diversion point, and the lack of well interference complaints for adequate wells completed into the Lower James-Missouri aquifer in Yankton County (Water Rights, 2023e), any drawdown created from the proposed diversion is not expected to cause an unlawful impairment on existing water right/permit holders or domestic users with adequate wells. Therefore, there is a reasonable probability that any interference from the proposed appropriation will not impose unlawful impairments on existing users with adequate wells.

CONCLUSIONS:

1. Water Permit Application No. 8765-3 proposes to appropriate water at a maximum instantaneous diversion rate of 1.78 cfs from one well to be completed into the Lower James-Missouri aquifer (approximately 200 feet deep) for the irrigation of 84 acres. The site of interest is in Yankton County, approximately 7 miles northeast of Yankton, SD.

2. Based on observation well data and the hydrologic budget, there is a reasonable probability that unappropriated water is available from the Lower James Missouri aquifer to supply the proposed appropriation.

3. There is a reasonable probability that the proposed diversion by Water Permit Application No. 8765-3 will not unlawfully impair adequate wells for existing water rights/permits and domestic users.

4. The applicant is requesting a diversion rate greater than the statutory limit of 1 cfs per 70 acres due to the sprinkler nozzle size, and the size and partial rotation of the center pivots. These types of reasons fall within SDCL 46-5-6 which allows the Water Management Board to allow a greater diversion rate.

Brittan Hullinger
Natural Resources Engineer I
SD DANR - Water Rights Program

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References

Bugliosi, E.F. 1983. Major Aquifers in Yankton County, South Dakota. SD DANR Geological Survey Program. Information Pamphlet No. 28. Vermillion, South Dakota.

Bugliosi, E.F. 1986. Water Resources of Yankton County, USGS Water Resources Investigations Report 84-4241. Huron, South Dakota.

Fahrenbach, M.D., Steece, F.V., Sawyer, J.F., et al. 2010. South Dakota Stratigraphic Correlation Chart. Oil and Gas Investigations 3. SD DANR-Geological Survey. Vermillion, SD.

Hedges, L.S., Allen, J., Holly, D.E. 1985. Evaluation of Ground-Water Resources Eastern South Dakota and Upper Big Sioux River, South Dakota and Iowa. Task 7: Ground Water Recharge. United States Army Corps of Engineers Contract DACW 45-80-C-0185.

Hedges, L.S., Burch, S.L., Iles, D.L. et al. 1982. Evaluation of Ground-Water Resources Eastern South Dakota and Upper Big Sioux River, South Dakota and Iowa. Task 1: Bedrock Topography and Distribution, Task 2: Extent of Aquifers, Task 3: Ground-Water Storage, Task 4: Computerized Data Base, Final Report. U.S. Army Corps of Engineers Contract DACW 45-80-C-0185.

Lindgren, R.J., and Hansen, D.S. 1990. Water Resources of Hutchinson and Turner Counties, South Dakota. Water-Resources Investigations Report 90-4093. USGS. Huron, South Dakota.

SDGS. 2023. South Dakota Geological Survey Lithologic Logs Database. SD DANR Geological Survey Program. Accessed June 21, 2023. http://cf.sddanr.net/lithdb/.

Stonesifer, J.R. 2014. Report to the Chief Engineer, Water Permit Application No. 7977-3, Dahlerup Family Trust, April 25, 2014. SD DANR Water Rights Program, Joe Foss Bldg. Pierre, SD.

Water Rights. 1995. Findings of Fact, Conclusions of Law, and Final Decision in the Matter of Water Permit Application No. 2313-2, Coca-Cola Bottling Company of the Black Hills. DANR-Water Rights Program file for Water Right No. 2313-2. Pierre, SD.

Water Rights. 2023a. "1979-2021 Irrigation Summaries by Aquifer" SD DANR-Water Rights Program. Joe Foss Building. Pierre, SD.

Water Rights. 2023b. Observation Well Data. SD DANR-Water Rights Program. Joe Foss Bldg. Pierre, SD.

Water Rights. 2023c. Water Right/Permit Files. SD DANR-Water Rights Program. Joe Foss Bldg. Pierre, SD.

Water Rights. 2023d. Well Completion Reports. SD DANR-Water Rights Program. Joe Foss Bldg. Pierre, SD.

Water Rights, 2023e. County Files. SD DANR-Water Rights Program. Joe Foss Bldg. Pierre, SD.